Portable U-matic VTR

VO-6800

PRODUCT INFORMATION

We have learned, through our experience, that camera operators may be distracted by three big anxieties of battery life, tape remaining time and recording condition. The VO-6800 was designed, taking into consideration the concept of "reliable camera recording" and "ease of use" in order to solve such common anxieties.

The main features of the VO-6800 are reliable recording, easy battery handling and tape remaining time indication, which are the solutions for three big anxieties. The size and weight have been greatly reduced thus achieving the smallest and lightest U-matic portable VTR in the world. Also, video and audio performance has been improved to satisfy professional users.

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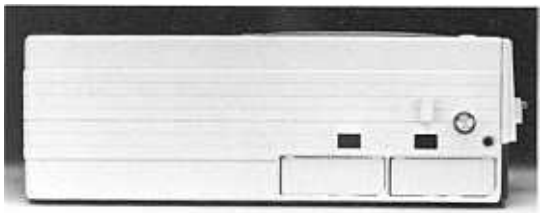
SOLUTION 1: Reliable Recording

- Video Confidence Head
- Warning System

SOLUTION 2: Ease of Battery Handling

- Adoption of Ni-Cd Battery
- Battery Remaining Indication
- Easy Battery Replacement



- Continuous Battery Operation

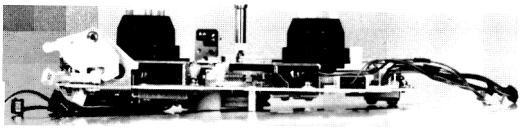
SOLUTION 3: Tape Remaining Indication

- Indication in the Viewfinder of a Connected Camera

- Warning Lamps

Compact & Light Weight

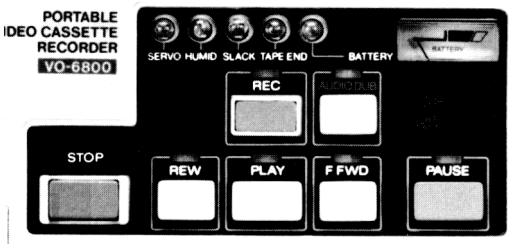
- Flat Drum Assembly
- Flat Direct Capstan Motor
- Flat Mechanism



- Simple One 'iece Mechanisr

Convenient and Reliable Control Functions

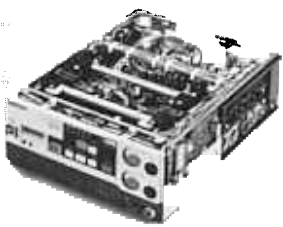
- Dual Purpose Feather Touch Key



- Remote C ıit (RM-68

Reliable Mechanism

- Rigid Mechanism
- Rain and Dust Proof
- Soft Eject Mechanism



High Performance

- Cross Color Improvement
- Quick and Stable Assemble Edit
- High Quality Audio
- ±10 Times Picture Search
- Real Time Tape Counter Display
- Self Diagnostics Function
- RF Modulator Capability

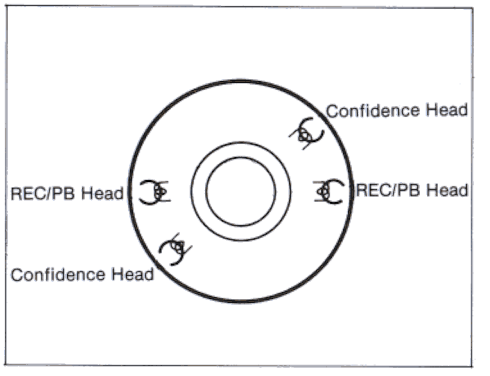
Solutions for Three Big Anxieties

SOLUTION 1: Reliable Recording

For a camera operator it is always a concern that the picture he sees in the viewfinder is being recorded on the VTR accurately. Sony's new portable U-matic VO-6800 is designed to achieve this end.

Video Confidence Head

The confidence heads, which are used for simultaneous monitor playback, are newly added on the head drum as shown by the figure. This prividesplay-back of a recorded picture in the viewfinder during recording. It is very convenient as real time recording check can be performed and troubles such as clogging can be quickly detected.



Warning System

The VO-6800 has LED indicators (SERVO, HUMID, SLACK, TAPE END and BATTERY) on the control panel, which blink or light to indicate the respective status. When an earphone is connected, audible 1 kHz alarm is heard simultaneously, and when a color video camera equipped with a Sony Q type (14 pin) connector is used, the warning lamps in the viewfinder blink to indicate the recorder's operating condition.

Warning lamps		Earphone tone	State	Camera tally lamps		VTR operation
Lamp	Operation			REC/TALLY	BATT*2	
SERVO*1	◔ (While in the recording mode)	∿∿∿∿∿		◔		
HUMID	○ (In all modes)	∿∿∿∿∿	Moisture condensation	◔		Recording continues, if the recorder is in the record mode, as long as the tape does not stick to the head drum. If this happens or the unit is in any of the other modes, the recorder will stop. Remove the cassette by pressing the EJECT button.
SLACK	◔ (In all modes)	∿∿∿∿∿	Tape slack	◔		Recording stops. Remove the cassette by pressing the EJECT button.
TAPE END	◒ (While in the recording mode)	∿	Near end	◒		Recording continues.
	○*3 (In all modes)	∿∿∿∿∿*3	Tape end	◔*3		Recording stops. Change the cassette.
BATTERY	◒ (In all modes)	∿ (While in the recording mode)	Near end	◒	◒	Recording continues.
	○ (In all modes)	∿∿∿∿∿	Discharge	◔	○	Recording stops. Change the batteries.

Meaning of the marks

Lamps	Sound of alarm
◔ Blinks in 4 Hz	∿ 1 second interval
◒ Blinks in 1 Hz	∿∿∿∿ 1/4 second interval
○ Lights up	∿∿∿∿∿ Continuous sound

*1 If the SERVO lamp blinks, check the connections.
*2 The BATT tally lamp functions when the VTR's battery pack or the camera's battery pack are exhausted.
*3 After the recording stops, the lamp and the earphone tone will go off.

SOLUTION 2: Ease of Battery Handling

When the current portable VTR is operated by a battery, an operator's concern is focused on the battery condition and awkward battery replacement. The VO-6800, with its battery remaining indication, easier battery replacement, continuous operation capability and adoption of Ni-Cd battery, eases difficulties brought on by battery handling.

Adoption of Ni-Cd Battery

There are various problems in the current lead battery, which led us to the decision to replace it with the Ni-Cd battery in conjunction with the camera products. The advantages of the Ni-Cd battery are:

1) Ni-Cd battery can be recharged even after over discharge.
2) Ni-Cd battery has longer life than the lead battery and can be used repeatedly.

Two fully charged batteries provide approximately one hour of continuous operation when the VO-6800 is used together with Sony's color camera DXC-M3 or DXC-M3A.

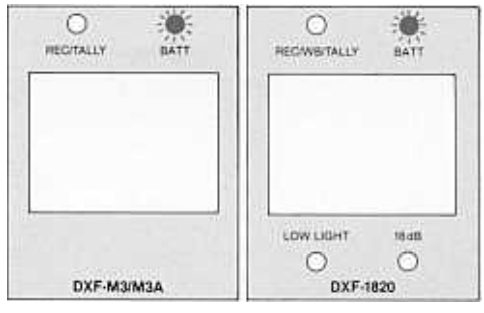
NP-1's in the BC-1WA

Battery Remaining Indication

Indication of the battery condition is made so that the operator can easily recognize the battery discharge.

Independent battery meter

An independent battery meter is provided for checking the battery condition. It provides battery remaining indication at a glance. Also, when the VTR equipment and several batteries are carried and is used in the field, this function can be used to check these batteries' charged conditions.



The needle of the battery meter indicates the battery condition. When the needle is pointing at the white scale, it means that the battery is fully charged. If the battery is somewhat consumed, the needle reaches the black scale. And when the needle approaches the left end of the black scale, the batteries should be replaced with fully-charged ones.

Warning lamp

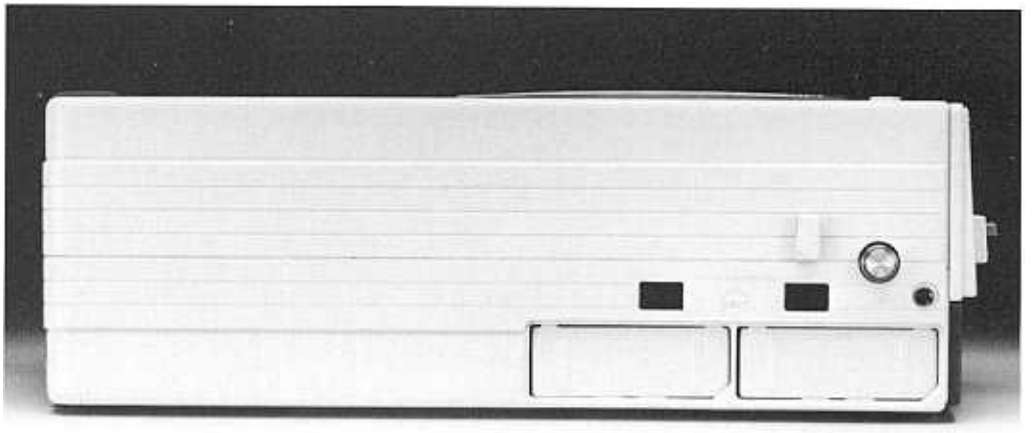
When the voltage of the NP-1 falls below its rated value (11.45V), the battery lamp will blink, and when the voltage falls to 11V, the recorder will automatically stop.

Warning lamp in a connected camera's viewfinder

The warning lamp for battery discharge also blinks in the viewfinder in conjunction with that of the VO-6800.

Easy Battery Replacement

Batteries can be easily inserted and ejected, because a pop-up system battery compartment was adopted and there's no need to remove the cover from the compartment window. Also the battery compartment is positioned at the upper part of the body side, so it can be reached easily by an operator.



Continuous Battery Operation

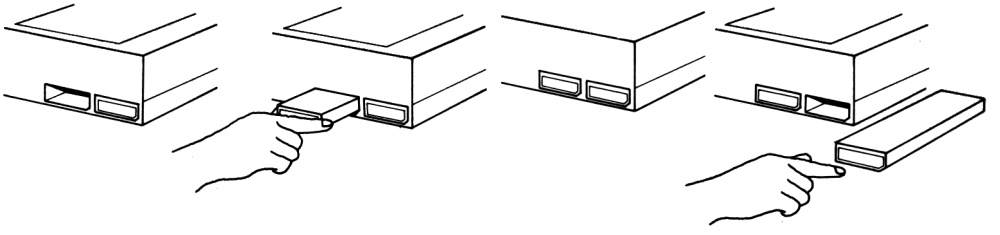
Parallel operation by two NP-1's

When using 2 NP-1 battery packs, battery operation is in parallel and approximately 120 minutes recording is possible in case that power is supplied only to the VTR.

Continuous operation

When continuous battery operation of more than 60 minutes is needed, it is possible by setting one battery in the battery compartment and by changing one by one. This enables continuous battery operation without stopping any functions of the VTR even for a second.

How to perform continuous battery operation



1. Put one battery into either battery compartment.
2. When the battery meter and the alarm indicate the battery discharge, put another fully-charged battery into the other compartment.
3. After the new battery is inserted, pull out the discharged one.

SOLUTION 3: Tape Remaining Indication

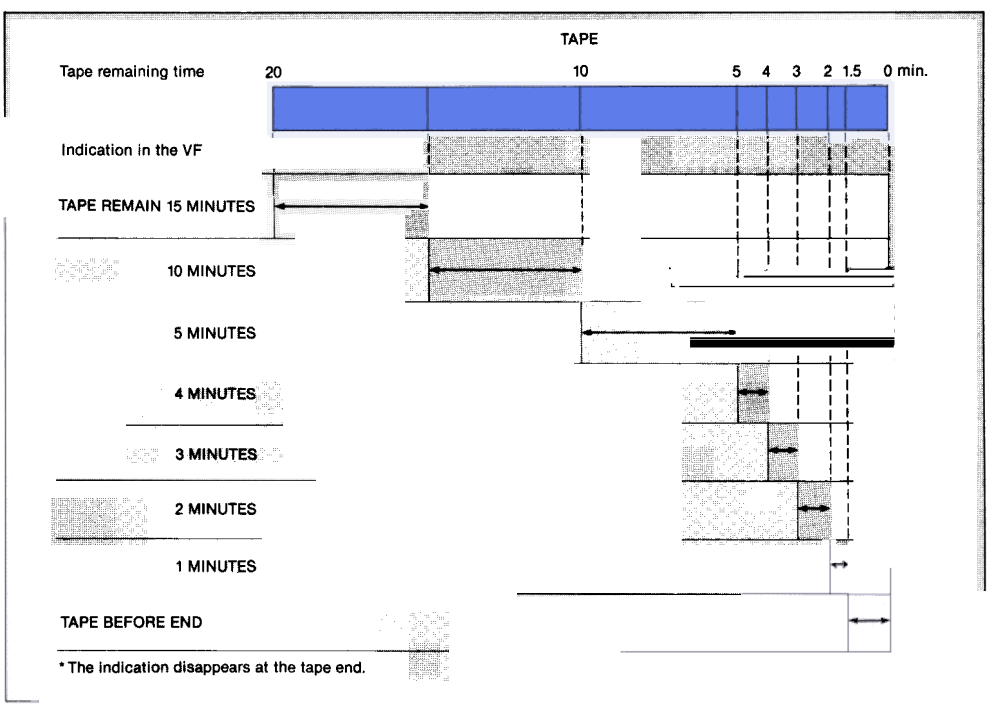
Another anxiety of a camera operator is the tape remaining condition. It is necessary for him to know how much the tape is remaining before shooting as well as during shooting. The VO-6800 provides the following features in order to solve this problem.

Indication on the Viewfinder of a Connected Camera

When recording with a camera, the tape remaining time is indicated on the viewfinder by the built-in character generator.

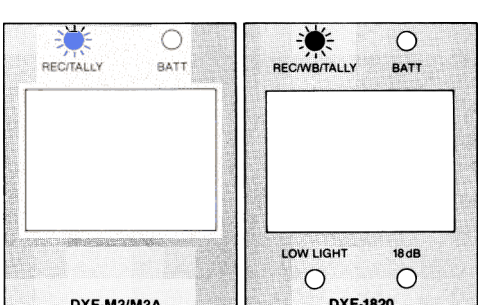
This function is available with Sony's video cameras by pressing the return video button while the VO-6800 is in the REC or REC PAUSE mode.

The time indication is as shown below:



Warning Lamps

The warning lamp on the VO-6800 and in the viewfinder of a connected camera blink from 1.5 minuts before the tape end.



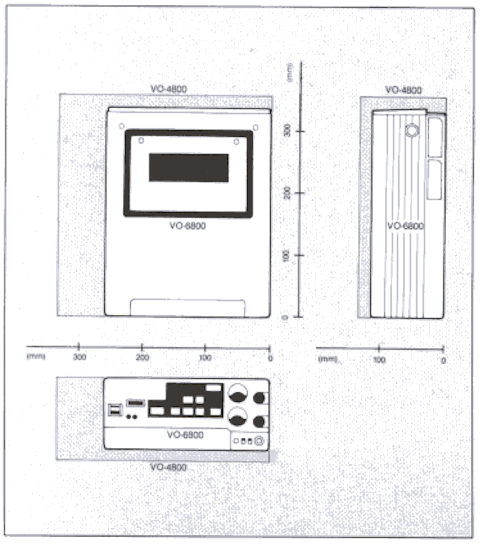
To Be More Portable . . .

Compact and Light Weight

Compact design and light weight —these are the ultimate goal which a portable VTR is aiming at. Still, it was very difficult to realize this with a U-matic VTR because of the cassette size and the drum size. The VO-6800 has conquered the ideal style through experience of designing the Type 5 series and the Betacam VTR's, maintaining mechanical reliablity and rigidness.

	Size	Weight
VO-6800	258 × 117 × 338 mm	5.5 kg
VO-4800	336 × 135 × 350 mm	8 kg
Ratio	64% (volume)	69%

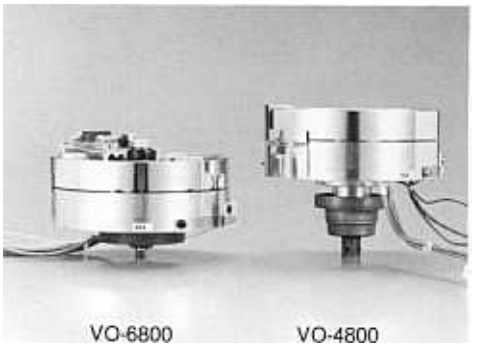
Compared with Sony's current portable U-matic, the VO-4800, the size and weight are greatly reduced, achieving the smallest and the lightest U-matic portable VTR in the world. This was realized by the following technical improvements.



Flat drum assembly

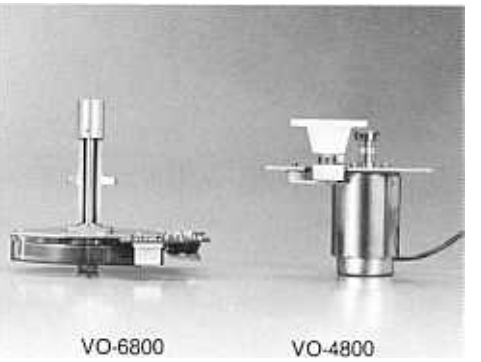
The size and weight of the drum assembly have been greatly reduced, thanks to the following mechanical improvements.

- The extra thickness of the drum scanner has been reduced from the VO-4800, maintaining rigidness.
- In order to achieve a compact size the height of the drum assembly has been made shorter.



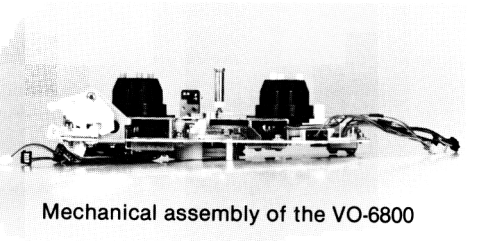
Flat direct drive capstan motor

The VO-6800 has adopted a flat direct drive capstan motor, which has been newly designed for the U-matic portable based on the Betacam portable VTR. As a result the size has been greatly reduced compared with the capstan motor used in the VO-4800 while at the same time efficiency and stability are improved.



Flat mechanism

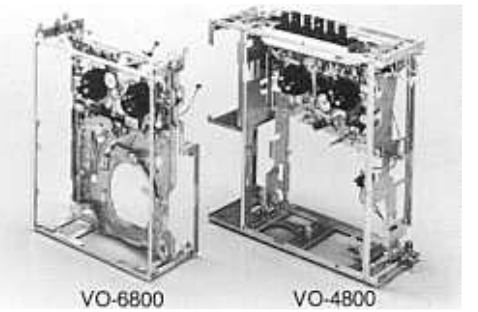
To reduce the size and weight of the mechanical part, compactness of every minute part was designed into the VO-6800.



Mechanical assembly of the VO-6800

Simple one piece mechanism

The VO-6800 has adopted a one piece aluminum die casting chassis which combines the basic mechanism of the drum scanner and the mechanical chassis. This has realized weight reduction of the chassis from 1.2kg to 400g. Moreover, operational preciseness and rigidness of the main mechanism are improved by this simple mechanism.



Other factors for compactness

- Flat loading ring
- Chip mount circuit boards
- Light-weight outside cabinet
- Miniatuarized parts
- Adoption of NP-1 battery pack

More Advanced Use . . .

Convenient and Reliable Control Functions

From the beginning of the control key design, thorough consideration was made for convenient use. As a result the feather touch key with logic control system and recording protection function has been adopted in the VO-6800. Also in order to expand the application of this VTR, a remote control unit (optional) is newly designed.

Dual purpose feather touch key

The feather touch keys on the VO-6800 not only provides operational ease by its logic control system, but protects recording from mis-operation by its function inhibit capability. This gives users dual convenience of a portable VTR and a playback machine.

Recording protection

When the VO-6800 is connected with a camera and in a recording mode by the camera's VTR start switch, key operation is inhibited except the "STOP" and "EJECT" keys. This reduces accidental mis-operation during camera shooting. (Function inhibit is effective only when the camera's VTR start switch is pressed. It is not activated by the REC button on the VO-6800.)

Logic control system

A reliable microcomputer control and improved tape transport mechanism allow for logic control system, making it possible to go into any other mode without going through the STOP mode. This is very useful when the VO-6800 is used as a playback machine.

Quick and reliable picture search

The VO-6800's logic control system provides very quick and reliable picture search function. With the feather touch key and logic control system key, operation is quick and smooth. Because of the new tape transport mechanism which protects the tape from wearing off, very reliable function is expected.

Remote control unit (RM-680)

The VO-6800 can be connected to the optional wired remote control unit RM-680. The RM-680 features compactness and remote control capability of all the basic functions. This unit is sure to help in expanding the applications of the VO-6800.

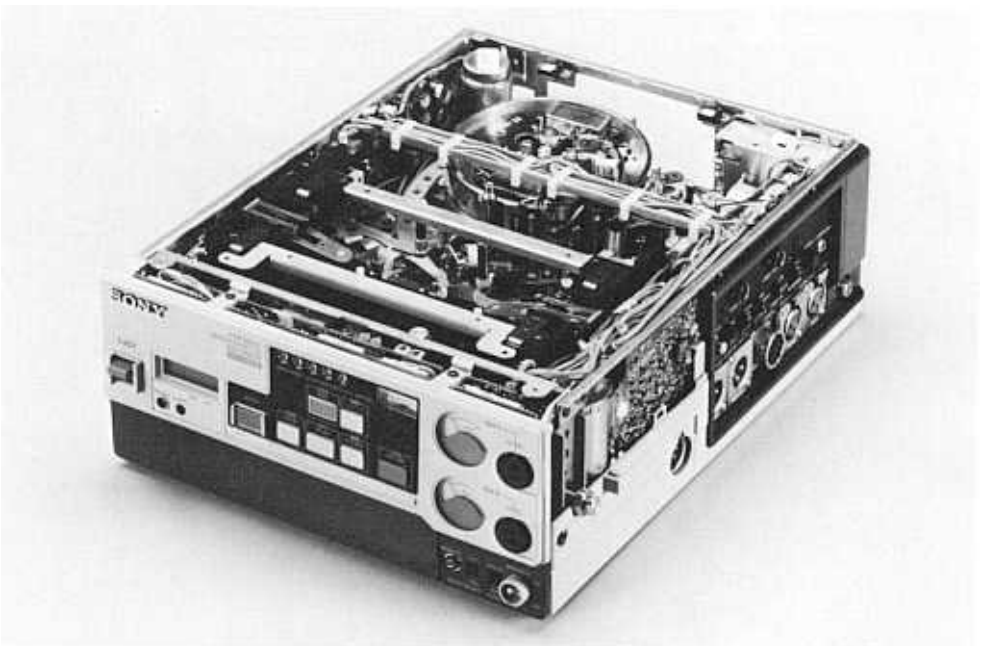
- **Small size and light weight**
  size: 65(w) × 18(h) × 150(d) mm
  weight: 110g
- **Remote control capability of basic functions**
  STOP, PAUSE, REC, PLAY, F FWD and REW
- **Special mini type cable (5m, supplied)**
  The cable which connects the remote control unit with the VTR is a special-mini type, and is light and flexible.
- **Extension capability**
  The distance between the VTR and the remote control unit can be extended up to 50m, providing a variety of applications.

Reliable Mechanism

Because a portable VTR is usually used outdoors, it is required to be rain, dust and mechanical shock proof. In the mechanical design of the VO-6800, priority was given to the reliable mechanism to allow users to fully enjoy advantages of this VTR.

Rigid mechanism

All the functions of the VO-6800 are protected by a new rigid mechanism, which puts the intensity of each component together and gives total rigidness. One piece die casting chassis which includes mechanical chassis and the basic mechanism of the drum scanner provides rigidness of the main mechanism and preciseness of the tape transport structure. The printed circuit boards fit in the mechanical frames to increase intensity. Also the outside cabinet is composed of two parts, which gives rigidness on corners.



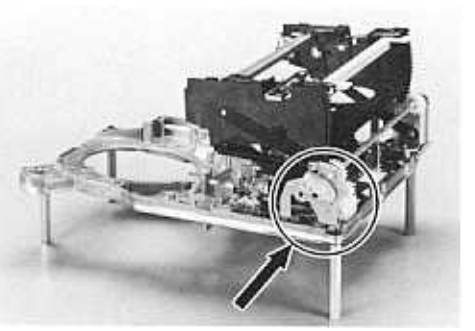
Rain and dust proof

The edge of the cassette compartment is shielded with rubber for rain and dust proof.

A carrying case was newly designed, providing convenient operation, and is rain and dust proof. Thanks to adoption of a transparent material at the control panel part, key operation is possible without opening the case. Also when changing cassettes, the lid can be opened, blocking rain by serving as a protective cover.

Soft eject mechanism

The cassette compartment can be ejected softly with a new mechanism. It was realized by a cassette compartment dumper and rubber friction.

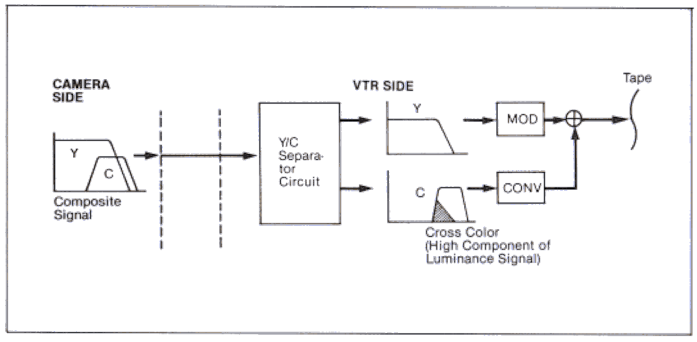


High Performance

U-matics are highly reputed for their exceptional performance in video and audio recording. The performance of the VO-6800 has been improved even further thanks to the following new technology incorporated in this machine.

Cross color improvement

Cross color phenomenon is minimized by a new cross color reduce circuit. This results in a very clear picture with the video input from a camera.



What is cross color?

In camera recording, the composite video signal from a color camera is put into the VTR. The input video signal in the VTR then goes through the Y/C separator circuit and is separated into luminance and chrominance. Here the high component of luminance signal leaks into the chrominance. When the luminance level goes up sharply, this brings about cross color phenomenon which appears on the monitor like a ringing phenomenon.

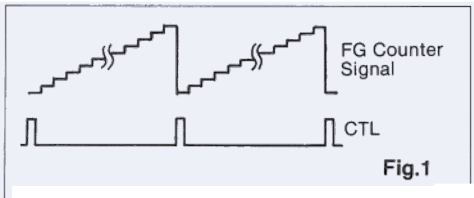


Fig.1

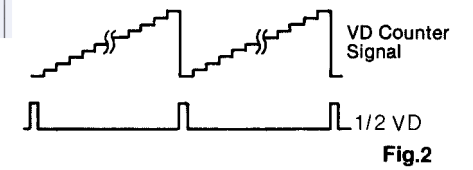


Fig.2

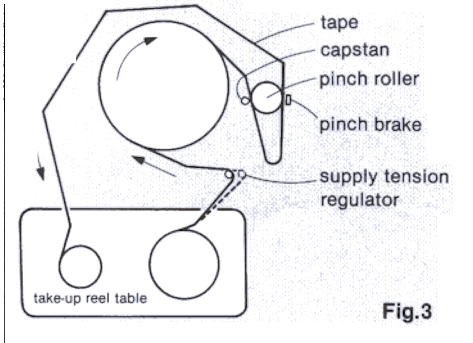


Fig.3

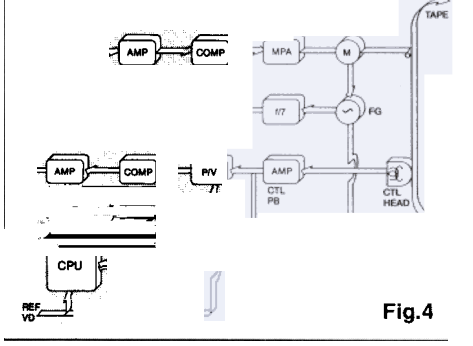


Fig.4

Quick and stable assemble editing

The VO-6800 provides quick and stable assemble editing thanks to a new intelligent high speed servo, which is an exclusive use for the backspace editing. With this system, the backspace distance was minimized to 4.5 CTL.

New Intelligent High Speed Servo

To perform backspace editing, the conventional VTR's utilize the ordinary PB servo, which performs the phase comparison between the 30 Hz (NTSC)/ 25 Hz (PS) reference signal and the CTL signal which is obtained by reproduction of the backspaced tape. Wtih this system, servo rising time is not fast enough and backspace editing cannot be performed completely.

The new intelligent high speed servo system employed on the VO-6800 is a new servo system which has given basic and total solution to this problem.

The FG signal is generated by the capstan motor and input into the built-in CPU, where the FG counter signal is generated. This FG counter signal is reset at each CTL signal, and devided to 30 steps in NTSC model/36 steps in PS model between each CTL timing. Therefore, each step indicates precise phase information even between each CTL signal. (The conventional system can not indicated phase information between each CTL signal.) — Fig. 1

At the same time the VD counter signal is generated by the built-in clock in the CPU. This signal is devided to 30 steps (NTSC)/36 steps (PS) between each 1/2 VD [30 Hz (NTSC)/25 Hz (PS)] timing and is reset at each 1/2 VD signal. Therefore each step indicates presice phase information between each 1/2 VD. — Fig. 2

Phase comparison is performed in each step of the FG counter signal and VD counter signal by the built-in CPU. If there's any phase error, it is converted from digital to analog, and speed control is made using this information.

In this way, quick and stable servo lock is obtained with 4.5 CTL tape backspacing.—Fig. 3

This high speed servo system is switched over to the ordinary servo after servo lock, as shown by the block diagram (Fig. 4).

High quality audio

Audio performance has been improved by the following new features.

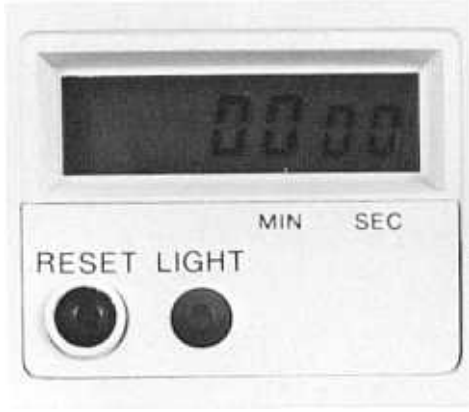
- **XLR connector (balanced)**
- **Sendast head**
  Thanks to adoption of the sendast head, signal-to-noise ratio (50dB) and frequency response (50 — 15,000 Hz) have been improved.
- **Direct drive capstan motor**
  Adoption of the direct drive capstan motor has realized 0.2% wow and flutter.
- **Mic level input −20dB/−60dB switchable**
  −20dB/−60dB switch is provided for camera mic input selection, allowing the VO-6800 to be connected with any camera that has either −20dB or −60dB mic level output. If the camera has the same switch, choose the same position both on the VO-6800 and on the camera.

±10 times picture search

Pictures can be monitored during rewind and fast forward mode at an approximate 10 time normal speed
A newly adopted reel motor provides exclusive use of this function and very stable performance is achieved.

Real time tape counter display

The LCD time counter indicates the accurate tape running time at the nominal playback speed in minutes and seconds.Even after the power is turned off, time log is preserved for approximately 2 minutes by the condencer backup system.



Self diagnostics function

By setting the switch inside the VO-6800, the self diagnostics function can be obtained. This function is made possible by the built-in micro computer, and indication is made on the LCD time counter. This provides a quick approach to solve a service problem.

RF modulator capability

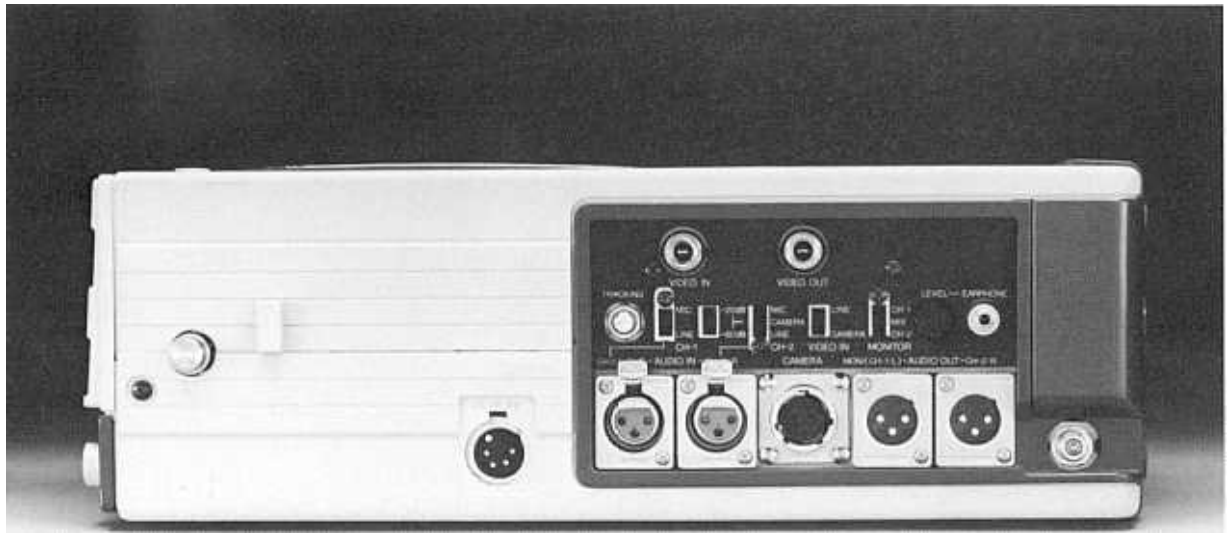
With the optional RFK-600 series, the VO-6800 can be connected with the conventional TV receiver.

RFK-600 series

Controls, Switches and Connectors

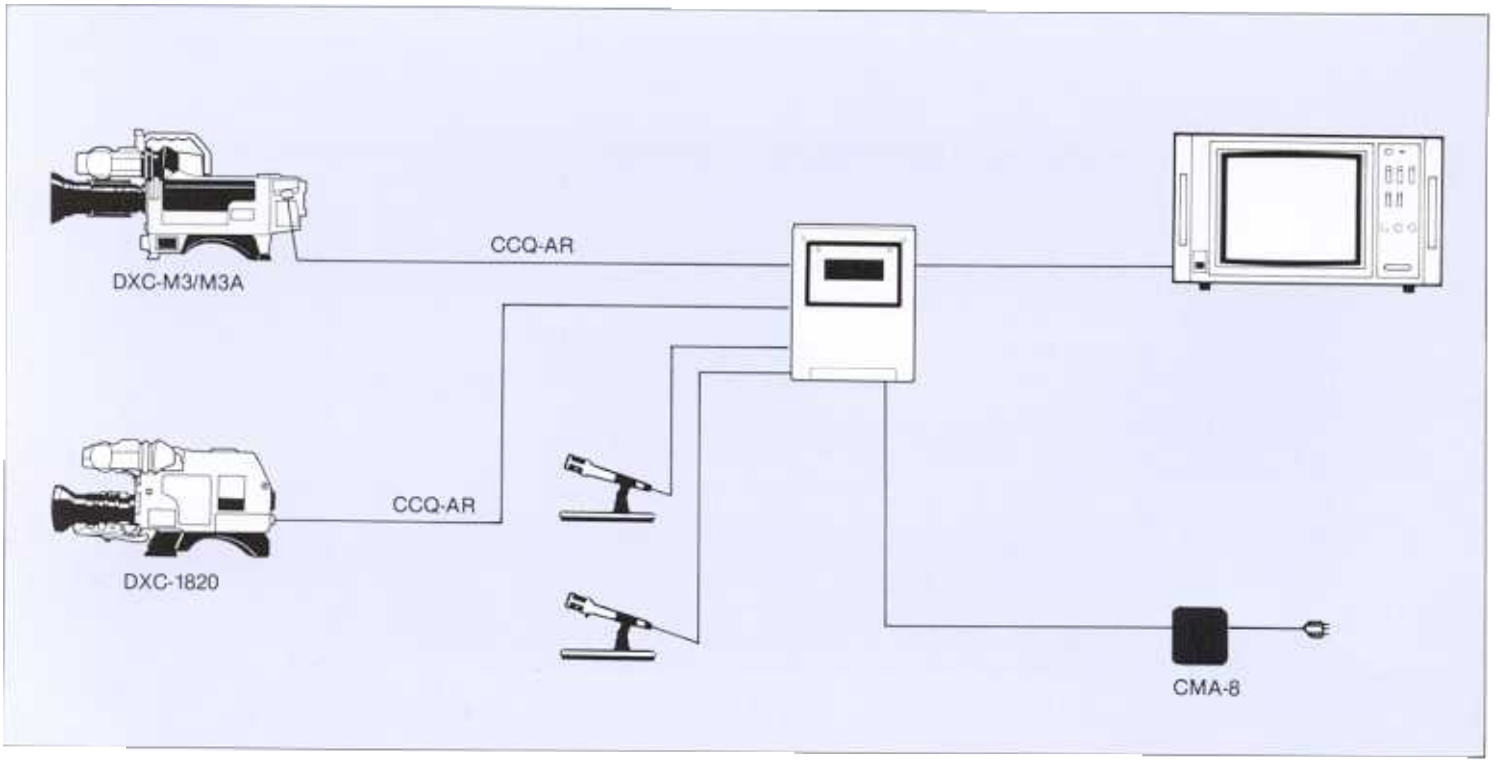
Control Panel

Connector Panel

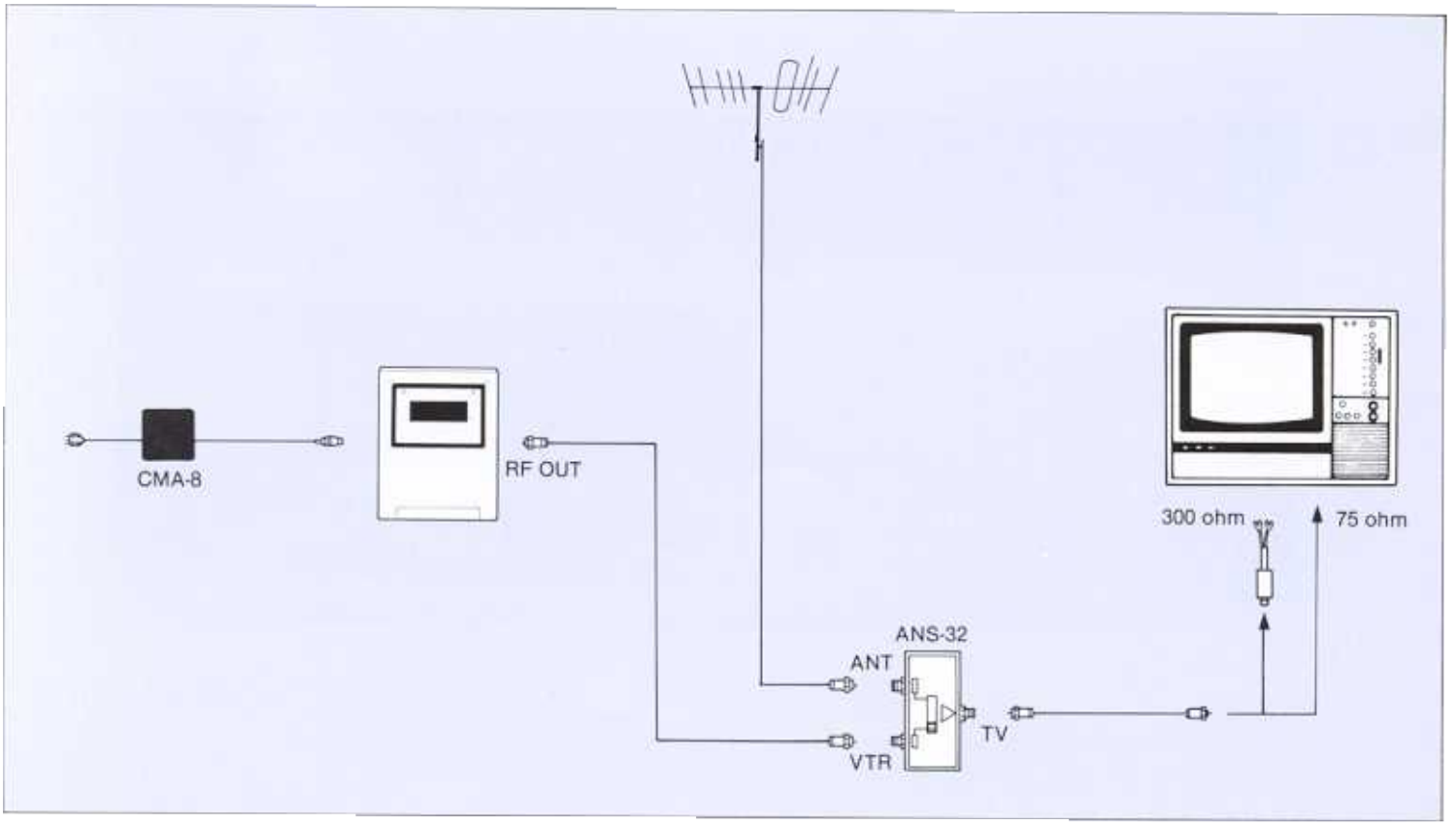


System Configuration

Camera recording



Playback on a Conventional TV Receiver



Specifications

VO-6800/6800PS

GENERAL	
Power requirements:	12 V DC
Power consumption:	DC 15.5 W (NTSC)/ 16.5 W (PS)
Connectors:	VIDEO IN: BNC type × 1 CAMERA: Q type, 14 pin × 1 VIDEO OUT: BNC type × 1 AUDIO IN CH-1/L/DUB and AUDIO IN CH-2/R: XLR type, female, × 1 AUDIO OUT MONI (CH-1/L) and AUDIO OUT CH-2/R: XLR type, male, × 1 DC IN 12 V: XLR type, × 1 RF OUT: F type (NTSC)/DIN (PS) × 1 REMOTE: Special mini type × 1
Operating position:	Both vertical and horizontal
Operating temperature:	0°C to +40°C (+ 32°F to + 104°F)
Storage temperature:	−20°C to +60°C (−4°F to 140°F)
Dimensions:	Approx. 258 × 117 × 338 mm (w/h/d) (10 1/4 × 4 5/8 × 13 3/8 inches) Not incl. projecting parts and controls
Weight:	Approx. 5.5 kg (12 lb 2 oz)

VIDEO	
Video head:	Rotary 4 head (R/P: 2, Confi: 2)
Video recording system:	Helical scanning, FM recording
Video signal system:	EIA-standards, NTSC color signal/CCIR-standards, PAL or SECAM color signal
Input:	Composite, sync negative 1 Vp-p $^{+1.0}_{-0.5}$ p-p, 75 ohms unbalanced
Output:	Composite, sync negative 1 Vp-p ±0.2 Vp-p, 75 ohms, unbalanced
Horizontal resolutions:	260 lines (NTSC)/250 lines (PS)
Signal-to-noise ratio:	Color: Better than 45 dB

AUDIO	
Input:	CAMERA (microphone input): −20 dB/−60 dB switchable, more than 3-kohm impedance, balanced AUDIO IN CH-1/L/DUB and AUDIO IN CH-2/R: Line input: + 4 dB, more than 10-kohm impedance, balanced Microphone input: −60 dB, more than 3-kohm impedance, balanced
Output:	AUDIO OUT MONI (CH-1/L)and AUDIO OUT CH-2/R: +4 dBm (at 600 ohm load), balanced EARPHONE: −20 to −33 dB (at 8 ohm load), adjustable
Signal-to-noise ratio:	Better than 50 dB
Frequency response:	50 Hz—15,000 Hz

TAPE TRANSPORT	
	9.53 cm/sec. (3.75 ips)
Wow and flutter:	Less than 0.2% rms
Recording time:	20 min. continuously with KCS-20K, 10min. continuously with KCS-10K
Rewind and fast forward time:	Within 3 min. (KCS-20K)
Operating time:	Approx. 120 min. continuously with the fully charged two NP-1 battery packs (Approx. 60 min. when supplying power to the color camera DXC-M3/M3A with the fully charged two NP-1 battery packs)
Interchangeability:	Fully interchangeable with all conventinal U-matic recorder/player
Usable tape:	KCS type tape

SPECIAL FUNCTIONS	
Video confidence and tape remaining time indication:	Possible with a camera having the return video function
Pause:	Possible
Search:	Possible (about 10 times normal speed in forward and reverse directions)
Edit:	Audio dubbing
Tracking control:	Possible
Remote control:	Recording, playback, fast forward, rewind, pause and stop, with an optional RM-680 remote control unit

Accessories supplied

- Carrying case (soft)
- Shoulder strap
- CCQX-2 connecting cable (2 m, 6 ft, for the CMA-8 camera adaptor)
- ME-20H earphone

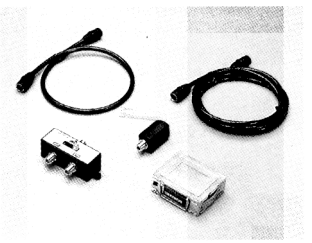
Optional accessories

RM-680
Remote control unit

CMA-8/8CE
Camera adaptor

BC-1WA
Battery charger

AH-6800
Carring handle



RFK-600 series
RF modulator

- NP-1 rechargeable battery
- KCS-10/20 series video cassette tape
- KCS-1C cleaning cassette
- Color video camera DXC-1800/1800P, DXC-1820/1820P, DXC-M3/M3P, DXC-M3A/M3AP, etc.

RM-680 Remote control unit

Power requirement:	5.0 V DC
Power consumption:	20 mW
Operating position:	Free
Connectors:	Special mini
Dimensions:	65 × 18 × 150 mm (2 5/8 × 3/4 × 5 7/8 inches)
Weight:	110 g (0.2 lb)
Cable length:	5 m (Can be extended up to 50 m)

CMA-8/8CE Camera adaptor

Camera input:	CAMERA/CCU connector, 14-pin Power output: 13 V, 5 A
Video output:	1.0 V (p-p), 75 ohms, sync negative, unbalanced
Audio output:	MIC OUT jack, XLR
Operating temperature:	0°C to +40°C (+32°F to +104°F)
Power requirements:	CMA-8: AC 120 V, 50/60 Hz CMA-8CE: AC 110, 127, 220, 240V, 50/60 Hz
Power consumption:	95 W
Weight:	2.8 kg (6.2 lb)
Dimensions:	105 × 105 × 308 mm (4 1/8 × 4 1/8 × 12 1/8 inches)

Design and specifications subject to change without notice.

Comparison Chart

	VO-6800/6800PS	VO-4800/4800PS
Manufacturer	SONY	SONY
Dimensions (W) (H) (D)	 258 mm 117 mm 338 mm	 336 mm 135 mm 350 mm
Weight	5.5 kg	8 kg
Power consumption	15.5 W (NTSC)/16.5 W (PS)	11 W
Battery • Series operation • Independent battery meter • Pop up function	 Yes Yes Yes	 No No No
DC IN connector	XLR-4P	DIN
U-scan	x10	x6—x12
FF, REW time	Less than 3 min	Less than 3 min
POWER sw	Yes	No
EJECT key	Mechanical	Piano key
Function button	Feather touch	Piano key
Simple remocon	RM-680 (option)	No
Key inhibit in REC mode	Yes (except STOP & EJECT)	No
LCD tape counter	Yes	No
RF modulator	Option	Yes (NTSC) Option (PAL)
VIDEO • H. resolution • S/N • Video confidence	 260 TV lines (NTSC)/250 TV lines (PS) 45 dB Yes (B/W, on VF)	 260 TV lines (NTSC)/250 TV lines (PS) 45 dB No

	VO-6800/6800PS	VO-4800/4800PS
AUDIO		
• frequency response	50—15,000 Hz	50—12,000 Hz
• S/N	50 dB	48 dB
• Wow and flutter	0.2 %	0.25 %
• IN/OUT connector	XLR/Balanced	Pin jack/Unbalanced
Tape remaining indication in VF	Yes	No
Video head	R/P head x2 CONFI head x2	R/P head x2
METER		
• Battery meter	Yes	Yes
• Video level	Yes	
• Audio CH-1 level		
• Audio CH-2 level	Yes	
• Hours meter	Yes	No
WARNING		
• Battery lamp	Yes	Yes
• Tape end lamp	Yes	Yes
• Servo	Yes	Yes
• Humid	Yes	No
• Slack	Yes	No
Assemble edit	Quick PB servo	Mechanical
Rain & dust proof	Yes	No
Drive system		
• Capstan	Direct drive	Indirect
• Drum	Indirect	Indirect
• Reel	Indirect	Indirect
Accessories		
• Carrying case	Yes	Yes
• Shoulder strap	Yes	Yes
• Carrying handle	Option	No
• AC adaptor	Option	Yes
• Others	Earphone, Connecting cable (COQX-2)	Earphone, Camera cable, Connecting cable